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ABSTRACT

As more people become computer literate, issues of privacy become more pertinent. Major privacy issues at the individual, national, and international levels are identified in the first part of the paper. These issues provide the basis for the second part of the paper, which is a report of a survey in which subjects were asked to indicate whether they felt the privacy issue was significant in general and the extent to which they personally felt affected by the issue. Questionnaires were distributed to 145 university students in the Midwest. The survey confirmed that most university students use computer technology regularly. For concerns at the individual level, the highest number of responses given for the following being "very likely to happen" or "already happening" were: the question of access by law enforcement agencies (87%); followed by insurance companies (71%); access to academic records (52%); driving records (51%); and access to credit card numbers by unauthorized persons (50%). Students showed the least level of concern that a computer hacker could learn things about them (7%). The responses also expressed concerns regarding privacy invasion on national and international levels. The most revealing aspect of this study was the extent to which general perceptions of invasion of personal privacy by computer technology have a significant, direct relationship to individual, national, and international concerns. (Contains 14 references.) (AEF)

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PRIVACY IN THE COMPUTER AGE: PERCEPTIONS AND REALITIES

by
Barbara Monfils

One aspect of visual literacy is computer literacy. As more and more people become computer-literate, issues of privacy are being raised more often. These issues involve individual rights, national concerns, and international cooperation. This paper begins with the identification of major privacy issues at the individual, national, and international levels. The issues identified in the first part of the paper provide the basis for the second part of the paper, which is a report of a survey in which subjects were asked to indicate whether they felt the issue was significant in general, and the extent to which they personally felt affected by the issue. The paper concludes with a discussion of results and implications for further study.

Almost everyone in contemporary society has some contact with information technology. From computers that generate utility bills and digital switching devices on long distance telephone calls to sensors on traffic lights that control traffic flow, computers are occupying a central role in our lives. In addition, ample evidence exists that information technology will continue to expand in the years ahead.

Theoretical Perspective

Several researchers have identified areas in which information technology will continue to have an impact on everyday live. Williams (1984), for instance, identifies the following: the growth of the "information business;" transportation; governance and politics; health care; work; leisure; education; and national development and world order. In his analysis, Bell (1973) focuses on the changing character of work in the information economy. Citing the shift from an industrial-based to a service-based economy, he notes the central role of computers and information. Toffler (1981) also places the computer at the center of his vision of "electronic cottages," the workplace of the twenty-first century. Dutton, Blumler, and Kraemer (1986) identify the "wired city" to describe ways in which households and businesses in urban areas will benefit from the increasing use of information technology. Thus, regardless of the specific application of technology, consensus has been reached on the increasing impact of information technology in all areas of life.

Computer literacy is also an important area within the general topic of visual literacy. Compaine (1988) links these two areas when he notes that skills in information technology will be required in order to function in society. He also argues that this form of literacy will supplement rather than supplant other definitions of literacy. He further compares traditional definitions of literacy, in which he includes devices such as the printing press and the steam engine, with changes in the way in which people think about conceptualizing and processing information as a result of information technology. In other words, to be computer-literate, one must be a computer user, but not a computer programmer.

Education is one area in which the growth of information technology has had a great impact. From preschoolers who are introduced to computers, to research universities with the availability of supercomputing, computers are being integrated into education more and more. Estes and Williams (1988) cite four reasons for this. First is the demand from parents, school boards, and citizens for computer instruction in the classroom.

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Secondly, decreasing costs for personal computers have resulted in greater numbers of p.c.s. being purchased by educational institutions. Thirdly is the ease of interactivity of this technology with other forms, including printers, videodiscs, videotapes, etc. Finally, the instructional process itself can be improved through individualized instructions, which has become more feasible with the growth of information technology. In short, computers are being used by more students at all levels. For many students facing the workplace of the twenty-first century, familiarity with information technology will be a necessity in order to compete in the global market.

These information technologies, however, do not exist in a vacuum. They are being developed and integrated within existing political, economic, and social concerns and issues (Gillespie & Robins, 1989). One of the most commonly-cited areas of concern is privacy. Although the role of privacy in the computer age in general has been widely-studied, specific privacy issues or threats to privacy are continually being raised. Mendes (1988) guides readers through a myriad of definitions of privacy, ranging from constitutional, common-law, and statutory definitions, to five major types of privacy concerns. She modifies Westin's 1967 definition of privacy to arrive at the following definition: "a condition in which individuals, groups, or institutions can determine for themselves, when, how, and to what extent private information about them is communicated to others." In accepting this definition for privacy, this author believes that such conditions can be either real (occurring in the external world) or perceptual (people believe them to be real, even without external verification). Definitions of privacy that include both real and perceptual dimensions is not without foundation. In 1984, a study conducted by Louis Harris and associates (1983) found that people in the United States not only believed that the centralization of information from many sources is possible with computers, but it is also a threat to personal privacy. In a more recent study, Gandy (1989) warns about the increasing use of automated methods of surveillance devices as potential sources of threats to the individual. Although Gandy is most concerned about privacy at the individual level, concerns occur at the national and international levels as well.

At the individual level, questions continue to be raised about the safeguards to the individual's right of privacy in a technological age. Recognizing that many Western governments have acknowledged and established rights to privacy in their political and/or judicial systems, these researchers cite the protection of privacy as a fundamental issues. While agreement seems to exist on the need for data acquisition, privacy concerns generally are raised on rights to access to the data once it has been gathered (Schirmacher, 1986). Such concerns range from information in data banks, which might be used by business or government, to information which a "hacker" might discover on an individual's personal computer.

At the national level, privacy issues are most closely related to the issues of security. Different nations in the world community have taken different approaches to these questions. In the United States, for instance, many early technological advances have been developed for strategic/military purposes, or matters of national security or national defense. At these initial stages, funding has come primarily or exclusively from the federal government. As the technological innovation expands beyond its defense-related applications, subsequent development shifts from government to business and industry. On the other hand, the governments of several European nations have taken a more central role in information technology development. Although policies and practices vary, in general, the role of government in information technology has been more direct in Europe (Monfils & Monfils, 1991). In Japan, too, direct governmental involvement has been clear and significant.

At the international level, issues of privacy become even more complex. They include not only the validity of information being transmitted across international boundaries, but also its ownership. Concerns have also been raised as to the rights, responsibilities, and protections that people have in trans-border data flow. For instance, do law enforcement agencies in one country have the right to share information with their counterparts in other countries, or does this violate the individual's right to privacy? What accountability exists with the way in which the receiving agency uses this information? Does the individual have a right to be notified? What about issues that are in the common interest, such as sharing information about possible terrorist groups or organizations? These issues are far from being settled (Monfils & Monfils, 1991).

Thus, a synthesis of research has led to the identification of privacy concerns at the individual, national, and international levels. These concerns relate to rights to privacy, protection from access by unauthorized persons or agencies, national defense, and international laws and cooperation. To what extent these concerns are actually being perceived by individuals is the focus of this research study.

Method

As computers are introduced more and more into education, students become the beneficiaries of these technological advances. As students become more experienced users of information technology, they should understand the limits of technology in regard to privacy. This study was done in order to provide answers to the following research questions:

1. Are university students using computers on a regular basis?

2. If so, what concerns regarding privacy do university students have?

3. Do relationships exist between the amount of technology use and level of concern of privacy at the individual, national, and/or international levels?

4. Is the perception that computers are likely to invade, or have already invaded, personal privacy related to concerns over specific types of privacy issues--i.e., individual, national, and international concerns?

To answer these questions, a survey was distributed to 145 university students in the Midwest in the U.S. In order to make the sample more broadly representative, questionnaires were distributed to students at all levels in their university studies, ranging from freshmen to graduate students, and to students in day and evening classes. Moreover, they were distributed to students on two different university campuses, one primarily a resident campus and one in which more than half of the students do not live on campus. Data collected from these surveys was analyzed using Release 4.1 of SPSS (Statistical Package from the Social Sciences). In this questionnaire, students were asked to indicate how often they used several forms of information technology, ranging from programming a VCR to using a personal computer. These questions formed the basis of a "Uses" subscale. They were also asked to indicate if they owned a personal computer or had taken a course with hands-on computer training. They were then asked to indicate how much of a concern they felt on invasion of privacy by computers in general, and on twenty specific privacy-related issues. Responses were based on a scale from "not likely at all to happen" to "has already occurred." These questions became the "Concerns" subscale. Demographic information on gender, age, major, and year in college was also gathered. Alpha coefficients were computed for the entire instrument and for the Uses and Concerns subscales of the questionnaire, with scores of .67, .78, and .93, respectively.

Results of this survey confirmed that

most university students use computer technology regularly, i.e., at least once a month. **Forty-one** per cent said they played computer games regularly, while **eighty-three** per cent said they used a personal computer for purposes other than playing games at least once a month. **Forty-seven** per cent said they used the mainframe university computer regularly, and **thirty-six** percent regularly used a mainframe computer at work. **Forty** percent of those surveyed said they owned a p.c., and **one-half** said they'd taken or were taking a computer course with hands-on training. Thus, in this study, most students use personal computer on a regular basis.

Students were than asked to indicate to what extent they felt concerned about certain issues related to privacy. Questions were asked relating to concerns at the individual, national, and international levels. Specific applications included banking, telephone services, grades, insurance, employment screening, law enforcement, and airline reservations.

For concerns at the individual level, the question receiving the highest number of responses as being very likely to happen or has already happened was the question of access by law enforcement agencies (**87%**), followed by insurance companies (**71%**), access to academic records (**52%**), driving records (**51%**), and access to credit card numbers by unauthorized persons (**50%**). Students showed the least level of concern that a computer hacker could learn things about them (**7%**).

Three questions were used to assess level of concern in regard to privacy on a national level--the government, the Internal Revenue Service, and national security agencies. Respondents split fairly evenly on both sides of these three questions, with **27** per cent expressing little or no concern about the government's having excessive information on them, **23** per cent expressing little or no concern about the IRS, and **30** percent expressing similar sentiments about national security agencies. On the other side, **47** percent said it was likely to happen or has already happened that the government has excess information on them, **52** percent responded similarly about the IRS, and **46** percent said national security agencies either have or were likely to have excessive information.

Respondents were also asked to indicate how likely it was to happen that international governments and international law enforcement agencies can learn information about them through information technology. Responses ranged from **30** percent as not at all likely or unlikely to happen to **36** percent who viewed this as likely to happen or already happening in reference to international governments. When asked about international law enforcement agencies, **29** percent said it was not at all likely or unlikely, while **48** percent said it was very likely or had already happened. Thus, students expressed concerns on issues related to privacy at the individual, national, and international level, with some issues at the individual level being perceived as more likely to happen than others.

Pearson product-moment correlation coefficients were computed to assess relationships between amount of technology use and concern over privacy issues. This was assessed in two ways: by individual uses of computers and by a combined category called general use. The general use category was determined by combining four types of computer use--game-playing, p.c. use, or mainframe use, either at the university or at work. Statistically significant relationships were found in many categories.

For instance, a significant direct relationship was found between those who regularly play computer games and the concern over access by law enforcement agencies (**r = .165; p = .05**). A significant **inverse** relationship occurred between those who regularly use a personal computer for purposes other than game-playing and concern over access by

law enforcement agencies (r = -.265; p = .01). Similar concerns were seen among those who regularly use a mainframe at work (r = -.207; p = .05). Non game-playing regular users of personal computers were also found to have a significant **inverse** relationship with the concern over access to high school or university grades (r = -.218; p = .01), while work-related mainframe use **inversely** correlated with concerns over records in data banks (r = -.235; p = .01). The same **inverse** relationship was seen between those who regularly use a mainframe at the university and concern over records in data banks (r = -.189; p = .05) and the concern of unauthorized changing of scores on computer games (r = -.170; p = .05). **Direct** relationships were established between the combined category of general computer use and concerns over access by law enforcement agencies (r = .1951; p = .05) and records kept in data banks (r = .1932; p = .05). An **inverse** relationship was detected among general uses and concerns that others could learn telephone calling card numbers (r = -.1817; p = .05). On the other hand, **no** statistically significant correlations were found between ownership of a personal computer and privacy concerns. **Inverse** relationships were found between taking a class with hands-on computer training and the following two concerns: law enforcement agencies (r = -.182; p = .05) and computer hackers (r = -.168; p = .05). **Direct** correlations were found between levels of computer anxiety and the following concerns: unauthorized access to driving records (r = .234; p = .01); unauthorized access to grades (r = .237; p = .05); unauthorized access to bank records (r = .201; p = .05); unauthorized access to credit card numbers (r = .190; p = .05); insurance companies (r = .253; p = .05); unauthorized withdrawal of funds from bank accounts (r = .207; p = .05); international governments (r = .196; p = .05); and international law enforcement agencies (r = .235; p = .05).

The fourth research question was whether relationships existed between perceptions of invasion of privacy by computer technology and specific privacy concerns. Pearson correlations were computed between responses to the item, "My personal privacy is invaded by computer technology," and each of the twenty specific concerns. Statistically significant direct correlations were found for **all** twenty applications.

Results are as follows:

concern over: access to driving records (r = .398; p = .01); unauthorized access to grades (r = .343; p = .01); unauthorized access to bank records (r = .341; p = .01); unauthorized access to telephone calling card number (r = .303; p = .01); unauthorized access to credit card number (r = .246; p = .01); insurance companies (r = .326; p = .01); prospective employers (r = .331; p = .05); law enforcement agencies (r = .213; p = .05); computer hackers (r = .269; p = .01); computer's keeping track of who and when phone calls are made (r = .194; p = .01); records kept on computer data banks (r = .406; p = .01); unauthorized alteration of scores on computer games (r = .190; p = .05); unknown people know a lot about me because of computer data banks (r = .338; p = .05); unauthorized withdrawal of funds from bank account (r = .323; p = .01); the Government (r = .278; p = .01); The Internal Revenue Service (r = .274; p = .01); national security agencies (r = .290; p = .01); international governments (r = .261; p = .01); international law enforcement agencies (r = .272; p = .01); and airlines (r = .370; p = .01).

Discussion

This study revealed several significant aspects. First, university students in this study were shown to be high users of computer technology, whether for relaxation, school, or work. Secondly, students expressed concerns about privacy issues at all levels,

individual, national, and international. While hands-on computer training may lower concerns about computer hackers and computers that keep track of phone calls, as level of computer anxiety increases, so, too, do concerns over driving records, grades, banking records, insurance, international governments and international law enforcement agencies. However, the most revealing aspect of this study was the extent to which general perceptions of invasion of personal privacy by computer technology have a significant, direct relationship to individual, national, and international concerns.

This study, however, is limited by certain factors. University students in this study regularly use computers to a greater extent than in several other studies, which suggest that many university students do not regularly use computers. Similarly, reported levels of computer anxiety in this study were less than other studies, some of which suggest that up to one-third of university students may be computer-phobic (DeLoughry, 1993). In addition, this study used self-reports of anxiety level, rather than applying other forms of measurement. Thus, the generalization of results from this study may be limited.

The relationships between computer literacy and ethics have yet to be fully documented. This study confirms research that significant relationships do exist between computer use and concerns over privacy issues. It is a topic that bears not only watching, but also assessing, as information technology continues to expand into the everyday life.

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